APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,408	07/21/2003	Chet R. Douglas	P16578	6803

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EXAMINER
SORRELL, ERON J

ART UNIT	PAPER NUMBER
2182	

DATE MAILED: 06/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
	10/624,408	DOUGLAS, CHET R.
Office Action Summary	Examiner	Art Unit	
	Eron J. Sorrell	2182	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *29 March 2006*.

2a) ☒ This action is **FINAL.** 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-28* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-4,6-8,10-15,17-21,23-25,27 and 28* is/are rejected.

7) ☒ Claim(s) *5,9,15,16,22 and 26* is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *26 April 2006* is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *20060323* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which

forms the basis for all obviousness rejections set forth in this

Office action:

> (a) A patent may not be obtained though the invention is not identically
> disclosed or described as set forth in section 102 of this title, if the
> differences between the subject matter sought to be patented and the prior
> art are such that the subject matter as a whole would have been obvious at
> the time the invention was made to a person having ordinary skill in the
> art to which said subject matter pertains. Patentability shall not be
> negatived by the manner in which the invention was made.

2.   Claims 1-3,6,10,18-20,23,27, and 28 are rejected under 35

U.S.C. 103(a) as being unpatentable over Adkisson (U.S. Patent

No. 5,590,304) in view of Batchelor (U.S. Patent No. 5,278,984).

3.   Referring to method claim 1, and article of manufacture

claim 18, Adkisson teaches a method for managing requests to an

Input/Output (I/O) device (see item 103 in figure 2),

comprising:

queuing I/O requests directed to the I/O device (see lines

35-45 of column 5);

calculating a coalesce limit (see lines 40-54 of column 6);

coalescing a number of queued I/O requests not exceeding

the calculated coalesce limit into a coalesced I/O request (see

lines 29-48 of column 6); and

transmitting the coalesced I/O request (see lines 35-45 of column 5).

Adkisson fails to explicitly set forth the limitation that calculating the coalesce limit is done in response to determining that a number of queued I/O requests exceeds a threshold, however Adkisson does teach determining when a threshold is reached, and continuing to receive I/O requests after the threshold has been reached and before the requests are burst transferred.

Batchelor teaches, in an analogous system, burst-transferring data after determining a threshold has been exceeded (see lines 9-13 of column 16).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the teachings of Adkisson with the above teachings of Batchelor. One of ordinary skill would have been motivated to such modification because Adkisson suggests the burst frequency is programmable providing operational flexibility.

4.   Referring to method claim 2 and article of manufacture claim 19, Adkisson teaches the calculated coalesce limit dynamically varies based in part on the number of queued I/O requests (see equation 1 in column 6 and lines 55-67 of column

6).

5.   Referring to method claim 3 and article of manufacture

claim 20, Adkisson teaches wherein calculating the coalesce

limit includes dividing the number of queued I/O requests by an

interval (see equation 1 in column 6 and lines 55-67 of column

6).

6.   Referring to method claim 6 and article of manufacture

claim 23, Adkisson teaches adding the transmitted coalesced I/O

request to the second queue (see paragraph bridging columns 5

and 6).

7.   Referring to method claim 10 and article of manufacture

claim 27, Adkisson teaches transmitting one I/O request from the

queue if the number of queued I/O requests does not exceed the

threshold (see lines 35-45 of column 5, note when the I/O rate

exceeds the memory rate, the requests are sent every clock

cycle).

8.   Referring to claim 28, Adkisson teaches the device

comprises a computer readable medium or a hardware component

(see item 102 in figure 2).

9.   Claims 4 and 21 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Adkisson in view of Batchelor as applied

to claims 1 and 18 above and further in view of Gunlock et al.

(U.S. Patent No. 5,522,054 hereinafter "Gunlock").

10.   Referring to method claim 4 and article of manufacture

claim 21, Adkisson teaches determining a maximum number of queue

I/0 requests up to the coalesce limit (see lines 29-48 of column

6), however the combination Adkisson and Batchelor is silent as

to that storage requests being directed to data stored at

sequential locations.

Gunlock teaches, in an analogous system, the above

limitation (see lines 40-60 of column 2).

It would have been obvious to one of ordinary skill in the

art at the time of the applicant's invention to modify the

combination of Adkisson and Batchelor with the above teachings

of Gunlock. One of ordinary skill in the art would have been

motivated to make such modification in order to improve disk

drive performance as suggested by Gunlock (see paragraph

bridging columns 2 and 3).

11.   Claims 7,8,11-13,17,24, and 25 are rejected under 35 U.S.C.
103(a) as being unpatentable over Adkisson in view Batchelor as
applied to claims 1 and 18 above and further in view of Marcotte
(U.S. Patent No. 6,292,856).

12.   Referring to method claim 7 and article of manufacture 24,
the combination of Adkisson and Batchelor teaches the method of
claim 5 and article of manufacture of claim 18, and further
teaches the second queue being implemented in a controller of
the I/O device (see item 201 within item 102 in figure 2). The
combination of Adkisson and Batchelor fails to teach the first
queue being maintained by a device driver.

Marcotte teaches, in an analogous system, the above
limitation (see item 74 within item 42 in figure 4).

It would have been obvious to one of ordinary skill in the
art at the time of the applicant's invention to modify the
combination of Adkisson and Batchelor with the above teachings
of Marcotte. One of ordinary skill in the art would have been
motivated to make such modification selectively cancel or move
the request to a difference device for servicing as suggested by
Marcotte (see abstract).

13. Referring to method claim 8 and article of manufacture
claim 25, Adkisson teaches the controller is a storage
controller (see lines 6-24 of column 5), and the device is a
storage device (see item 103 in figure 2).

14. Referring to claim 11, Adkisson teaches a system (see
figure 1) for managing requests to a storage device (see item
103a in figure 1), wherein the storage controller manages access
to the storage device, comprising:

     a processor (see item 101a in figure 1);

     a memory device accessible to the processor (see item 103a
in figure 1);

     wherein the operations are performed, the operations
comprising:

     queuing I/O requests directed to the I/O device (see lines
35-45 of column 5);

     calculating a coalesce limit (see lines 40-54 of column 6);

     coalescing a number of queued I/O requests not exceeding
the calculated coalesce limit into a coalesced I/O request (see
lines 29-48 of column 6); and

     transmitting the coalesced I/O request (see lines 35-45 of
column 5).

Adkisson fails to explicitly set forth the limitation that calculating the coalesce limit is done in response to determining that a number of queued I/O requests exceeds a threshold, however Adkisson does teach determining when a threshold is reached, and continuing to receive I/O requests after the threshold has been reached and before the requests are burst transferred.

Batchelor teaches, in an analogous system, burst-transferring data after determining a threshold has been exceeded (see lines 9-13 of column 16).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the teachings of Adkisson with the above teachings of Batchelor. One of ordinary skill would have been motivated to such modification because Adkisson suggests the burst frequency is programmable providing operational flexibility.

The combination of Adkisson and Batchelor fails to teach the above operations are performed by a device driver executed by the processor.

Marcotte teaches, in an analogous system, the above limitation (see item 74 within item 42 in figure 4).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the

combination Adkisson and Batchelor with the above teachings of

Marcotte. One of ordinary skill in the art would have been

motivated to make such modification selectively cancel or move

the request to a difference device for servicing as suggested by

Marcotte (see abstract).

15. Referring to claim 12, Adkisson teaches the calculated

coalesce limit dynamically varies based in part on the number of

queued I/O requests (see equation 1 in column 6 and lines 55-67

of column 6).

16. Referring to claim 13, Adkisson teaches wherein calculating

the coalesce limit includes dividing the number of queued I/O

requests by an interval (see equation 1 in column 6 and lines

55-67 of column 6).

17. Referring to claim 17, Adkisson teaches transmitting one

I/O request from the queue if the number of queued I/O requests

does not exceed the threshold (see lines 35-45 of column 5, note

when the I/O rate exceeds the memory rate, the requests are sent

every clock cycle).

18. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson in view of Batchelor and further in view of Marcotte as applied to claim 11 above and further in view of Gunlock.

19. Referring to claim 14, Adkisson teaches determining a maximum number of queue I/0 requests up to the coalesce limit (see lines 29-48 of column 6), however the combination of Adkisson and Marcotte fails to teach the storage requests being directed to data stored at sequential locations.

Gunlock teaches, in an analogous system, the above limitation (see lines 40-60 of column 2).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the combination of Adkisson and Marcotte with the above teachings of Gunlock. One of ordinary skill in the art would have been motivated to make such modification in order to improve disk drive performance as suggested by Gunlock (see paragraph bridging columns 2 and 3).

Allowable Subject Matter

20. Claims 5,9,15,16,22, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if

rewritten in independent form including all of the limitations

of the base claim and any intervening claims.

Response to Arguments/Amendment

21.   Applicant's arguments, see last paragraph of page 10 and

first full paragraph of claim 11, with respect to claims 5,15,

and 22 have been fully considered and are persuasive.   The

rejection of 5,15, and 22 has been withdrawn.

22.   Applicant's arguments with respect to claims

2,3,10,12,13,19,20, and 27, have been fully considered but are

not persuasive.   The applicant argues:

    1) Adkisson fails to teach the calculated coalesce limit

varies based on the number of queued request (see last paragraph

of page 8);

    2) Adkisson fails to teach the calculated limit includes

dividing the queued I/O requests by an interval (see paragraph

bridging pages 9 and 10);

    3) Adkisson fails to teach transmitting one I/O request if

the threshold is not reached (see 5th full paragraph on page 11).

23.   As per arguments 1 and 2, the Examiner disagrees.   At lines

50-55 of column 6, Adkisson discloses a formula for calculating

the maximum burst size. The equation comprises *the variable "N"* which represents the initial amount of data in the queue (emphasis added, see lines 40-49 of column 6), therefor the burst size varies with N, the number of requests. Adkisson's formula has the value A-1 in the denominator, wherein A is the clock cycle which is an interval of time.

24. As per argument 3, the Examiner disagrees. Adkisson teaches that the burst transfers occur only when the memory clock rate exceeds the I/O clock rate, and further teaches that these clock rates can be equal (see lines 35-45 of column 5). If the two clock rates are equal each request will get serviced as soon as it enters the queue and there will be no build up of requests in the queue, thus the threshold will not be reached.

25. Applicant's amendment has changed the scope of the invention because the pre-amended claims required only *conditionally* calculating a coalesce limit based on *whether or not* a determination is made. The claims now require calculating the coalesce limit *when* the determination is made.

Conclusion

26. Applicant's amendment necessitated the new ground(s) of

rejection presented in this Office action. Accordingly, **THIS**

ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is

reminded of the extension of time policy as set forth in 37

CFR 1.136(a).

A shortened statutory period for reply to this final action

is set to expire THREE MONTHS from the mailing date of this

action. In the event a first reply is filed within TWO MONTHS

of the mailing date of this final action and the advisory action

is not mailed until after the end of the THREE-MONTH shortened

statutory period, then the shortened statutory period will

expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated

from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than

SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier

communications from the examiner should be directed to Eron J.

Sorrell whose telephone number is 571 272-4160. The examiner

can normally be reached on Monday-Friday 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are

unsuccessful, the examiner's supervisor, Kim Huynh can be

reached on 571-272-4147. The fax phone number for the

organization where this application or proceeding is assigned is

571-273-8300.

Information regarding the status of an application may be

obtained from the Patent Application Information Retrieval

(PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through

Private PAIR only. For more information about the PAIR system,

see http://pair-direct.uspto.gov. Should you have questions on

access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or

access to the automated information system, call 800-786-9199

(IN USA OR CANADA) or 571-272-1000.

EJS
June 7, 2006

KIM HUYNH
SUPERVISORY PATENT EXAMINER

6/8/06